



First Report of *Alternaria* Leaf Blight in *Bael* (*Aegle marmelos* (L.) Corr.) from Eastern Plateau and Hill Region of India

Short Note

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ABSTRACT

Bael (*Aegle marmelos*) is one of the important known fruit crops of India which have widely distributed in Northern India. *Alternaria* leaf blight of *Aegle marmelos* (L.) (*Bael*) was reported for the first time in from Eastern Plateau and Hill region of India. The symptoms initially observed as light brown to dark brown spots of indefinite size appearing on leaves with light brown or dark brown rings. Infected leaves further get blighted and fall down after drying and in extreme cases of disease entire infected plants become died. The disease was observed both in nursery and orchards but in nursery it observed quite severe than orchard. The disease-causing pathogen was isolated and identified as *Alternaria alternata* on the basis of its disease symptoms, colony morphology and microscopic characteristics of mycelium, conidiophores and conidia. *Alternaria* leaf blight of *bael* was successfully managed by the foliar application of Chlorothalonil 75WP @ 2.5-3g/L / Carbendazim 50 WP @ 1-1.5g/L.

Keywords: *Aeglemarmelos*, *Alternaria alternata*, colony morphology, pycnidial characteristics, brown leaf blight.

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INTRODUCTION

Aegle marmelos (L.) Corr. is one of the sacred trees of Hindus and is highly popular for its medicinal properties. The tree belongs to the family *Rutaceae*, which is widely described in the literatures of Ayurvedic and Siddha systems of medicines. In India, this tree is commonly known as “*Bael Tree*” and is known as worship plant, leaves of which are devoted to lord Shiva. It have potential to treat a wide variety of ailments viz. stomach related problems, diarrhoea, astringent etc. It has a wide range of biodiversity and is predominantly found in tropical and subtropical region. The tree grows wild in dry forests on hills and plains of northern, central and southern India, Burma, Pakistan, Bangladesh, Sri Lanka, Northern Malaya, Java and Philippine Islands (Islam *et al.*, 1995). It is slow-growing, medium sized tree, up to 12-15 m tall with short trunk, thick, soft, flaking bark, and spreading, sometimes spiny branches, the lower ones drooping. The deciduous, alternate leaves, borne singly or in 2's or 3's, are composed of 3 to 5 oval, pointed, shallowly toothed leaflets, 4-10 cm long, 2-5 cm wide, the terminal one with a long petiole. New foliage is glossy and pinkish-maroon and mature leaves are dark green which emit a disagreeable odour when bruised. Flowers are fragrant, found in clusters of 4 to 7 along the young branchlets and the fruits are round, pyriform, oval, or oblong, 5-20 cm in diameter, may have a thin, hard, woody shell or a more or less soft rind, gray-green until the fruit is fully ripe, when it turns yellowish filled with aromatic, pale orange, pasty, sweet, resinous, more or less astringent, pulp (Orwa *et al.*, 2009). In India flowering occurs in April and May soon after the new leaves appear and the fruit ripens in 10 to 11 months from bloom i.e. March to June of the following year. *Bael* has several ethno-medicinal/medicinal importance

and being used since time immemorial. At present *bael* has become an important source of medicine for curing various human and animal diseases (Kala, 2006). The entire plant or its individual parts can be used for the treatment of various disorders in human being such as, diabetes, liver toxicity, fungal infection, microbial infection, inflammation, pyrexia and to relieve pain (Sharma *et al.*, 2011, Purohit and Vyas, 2005). Its fruits are used for pickling and sugar impregnated sweets called *murabba* when raw and after ripening used for making jelly, shakes and juices which gives cooling effect to the body especially in summers.

Bael plant is quite resistant to diseases and there is no report available on the diseases of this plant except one by Madaan and Gupta (1985) as leaf spot disease caused by *Alternaria alternata* (Fr.) Keissler in northern India. The *bael* fruit seems to be relatively free from pests and diseases except for the fungi causing deterioration in storage (Orwa *et al.*, 2009). In the Eastern Plateau and Hill Region, there was observed a severe leaf blight of *bael* is newly established orchards, both in young (2 year plants) as well in mature orchards at ICAR Research Complex for Eastern Region Research Centre, Ranchi, Jharkhand, India (23° 45'N latitude, 85° 30'E longitude, elevation 620 m AMSL) in the month of Aug. 2013. When we see the weather parameter especially minimum and maximum temperature, rainfall and humidity indicate that minimum temperature range for 22.8°C- 24.25°C and max. Temp. 27.33°C to 30.50°C and humidity more than 90% and rainfall which favours the disease proliferation in *Bael* (Fig. 1). A survey was conducted to in the adjoining districts of Ranchi district and the disease was observed also at three different locations which included Gumla (23.0°N latitude, 84.5°E longitude) Khunti (23.4°N latitude, 84.6°E longitude) and Lohardaga (23.4°N latitude, 85.2°E longitude)

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districts of Jharkhand during the month of Aug-Sep, 2013. The symptoms of the disease initially were observed as brown or black coloured spots of indefinite size appearing on leaves with light brown or dark brown rings. Affected leaves further blighted and fall (Fig 1, a-e). Infected leaves were collected from the *bael* orchard and then a study was conducted in Laboratory of Plant Pathology, ICAR- Research Complex for Eastern Region, Research Centre, Ranchi for isolation and identification of the associated pathogen with the blight of *bael*. The diseased leaves were surface washed with help of AgNO_3 and subsequently washed with sterile distilled water. Infected tissues were then cut into small pieces with sterile knife and kept in the moist filter paper chamber (Whatman filter paper, No. :1) for induced mycelial growth of the fungal pathogen. After mycelial growth was initiated, a small fragment of fungal hyphae were isolated on PDA medium. The Petri dishes were incubated at $27 \pm 2^\circ\text{C}$ in BOD. The pure culture was purified with the help of hyphal tip isolation techniques on PDA slants for further morphological studies. Semi-permanent mount slides were prepared by using lactophenol cotton blue and examined under a phase contrast

microscope (type 020-519.503 LB 30T, Leica, Germany) equipped with a Photomicrographic camera. The conidiophores were dark bearing a chain of conidia. Conidia with both cross and longitudinal septa with an appendage, characteristics of *Alternaria* sp were observed. The average size of the conidia was $25-60 \times 10-16 \mu\text{m}$ ($n = 25$) (Fig-1, e). Test of pathogenicity was also tested and confirmed their pathogenic nature of the isolated pathogen. Effect of environmental factors temp ($15-25^\circ\text{C}$ and RH $>80\%$ and leaf wetness (rain dew) for 4-24 hrs, for disease development and its epidemics have been respond by survival (Ansari *et al.*, 1989, Degenhardt *et al.*, 1982.).

On the basis of disease symptoms on plant and morphological features fungal colonies and microscopic observations of conidiophores and conidia the isolated pathogen was confirmed as a *Alternaria alternata*. The *Alternaria* blight of *bael* was first observed, diagnosed and characterized in Eastern Plateau and Hill region of India. Disease management was performed successfully by the foliar application of Chlorothalonil, 75 WP @3g/L followed by a spray of Carbendazim, 50 WP @ 1-1.5g/L after 15 days interval.



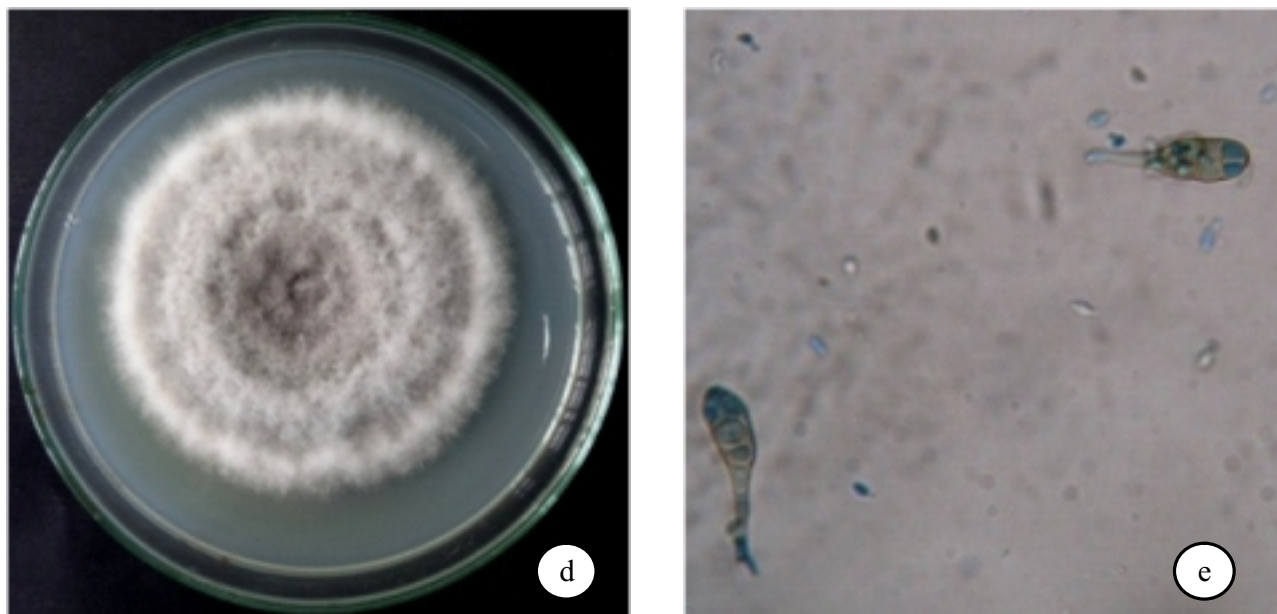


Fig. 1: *Alternaria* leaf blight in bael (a) blighted young *bael* plant (b) Close-up view of *Alternaria* leaf spot (c) severe *Alternaria* leaf blight in bael plantation (d) Colonies of *Alternaria* on PDA media (e) Microphotograph of the conidia of *Alternaria alternata*

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